User Manual
PVL Cutting Torch

Revision 2012
Incl. IMCA Safety Flash May 2012

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Insets:

- Drawing 01-0011 Exploded view cutting head
- Drawing 01-0012 Exploded view torch grip

APPLIED WARNING SIGNS

This is an indication for a very dangerous situation that can cause severe injury or death.

This is an indication for a dangerous situation that can cause injury or severe damage to the equipment.

This is an indication for a situation that can cause damage to the equipment.

1 Description of the cutting torch.

1.1 Introduction.

The cutting torch is designed exclusively for use under water.
It differs from other underwater cutting torches by:

- Low costs per meter compared to thermal cutting devices (no expensive electrodes, works faster because no electrodes need to be exchanged).
- Easier to use than the out-of-date Pickard and Messer-Griesheim gasoline torches.
- Less sensitive for contaminated cutting surfaces.
- Spare parts can be supplied from stock.

DANGER

For safe use of the cutting torch, experience with a surface cutting torch is required. It is also presumed that the user of the torch is an experienced diver.

The **PVL** torch uses Oxygen and Gas as a cutting medium (See table on page 5). It has a three-hose system, which uses one hose for the Gas, one for the Oxygen and one for the cutting Oxygen.
The inner diameter of the hoses is 9 mm.
The **PVL** torch is available with a cutting head under 55° and 90°, and is supplied together with the maintenance tools in a solid case.

1.2 Gas and Oxygen

It is not possible to adjust the cutting flame under water. The flame is adjusted by adjusting the pressure reducers above the water.

Table pressure / diving depth

Depth (msw)	Gas pressure (bar)	Oxygen pressure (bar)	Cutting oxygen pressure (bar)
0	1	4	6,5
5	1,5	4,5	7
10	2	5	7,5
15	2,5	5,5	8
20	3	6	8,5
25	3,5	6,5	9
30	4	7	9,5
35	4,5	7,5	10
40	5	8	10,5
45	5,5	8,5	11
50	6	9	11,5

De pressures for the cutting Oxygen as indicated in the table apply up to 25 mm material thickness. When cutting a thicker material the pressure for the cutting Oxygen can be raised without negative effects on the adjustment of the torch.

The Gas used for the torch is Propylene, and is being sold under various trading names:

Gas table

Gas supplier	Trading name
Hoekloos	MAPP-S gas
AGA	Tetreen
Air products	Apachi-S gas
Messer-griesheim	Megrileen
Air liquide	Tetreen
Indugas	MAPP-S gas
West falen	Wegaleen

2 The operation

2.1 Connecting the PVL cutting torch

- **Make sure that during connecting or disconnecting no sand or other contaminations can come into the torch or the hoses. This will result in malfunctions during cutting.**
- **Check hoses and connections for leakage before use.**

- **Bottles should only be changed by personnel familiar with handling high pressure oxygen systems.**
- **Oxygen can react spontaneously to flammable substances such as oil or grease. Always make sure no grease, oil or other contaminants are present on parts of the Oxygen bottle or reducers to avoid risk of fire or explosion.**
- **Always make sure the bottles are changed and stored in a well ventilated area.**
- **Avoid all smoking, open fire or other ignition sources in the vicinity of the installation.**
- **The used Gas is highly flammable. In high concentrations it can cause suffocation, in lower concentrations it has narcotic effects and can cause dizziness, sickness and balance disturbances.**

Oxygen bottles can be used horizontally, when used vertically the bottles should be secured to prevent falling.
The Oxygen bottles are to be connected together (Quads) to avoid Oxygen bottle change out.

The Gas bottles must always be used vertically, to be connected to each other to avoid the number of change outs and secured against falling.

- Connect the Gas and Oxygen reducers to the bottles.
- Connect the hoses and the PVL torch >
- Ensure all bottle connections have flash arrestors/non return valves fitted and the torch side is fitted with non return valves.
- The connections on the torch are marked with:
- O^2 for the Oxygen.
- O^2l for the cutting Oxygen.
- G for the Gas.
- Adjust the pressure of both Oxygen reducers to the pressure according to the diving depth (see table on page 5).
- Adjust the Gas pressure to 1 - 1.5 bar.

When adjusting the cutting Oxygen pressure, valve (2) should be opened.
When adjusting the Gas and Oxygen pressures, valve (1) should be opened.
(see photo on next page)

2.2 The cutting

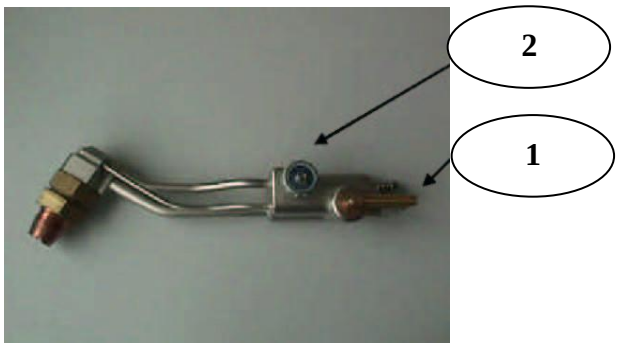
WARNING

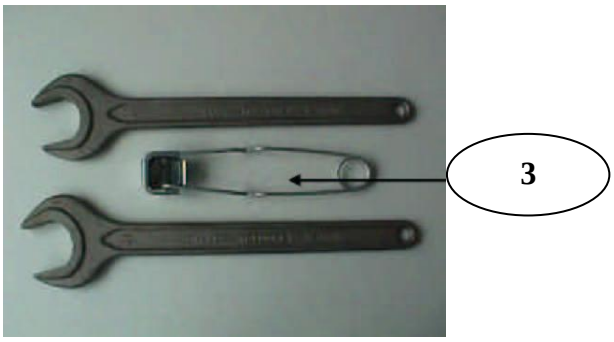
- **The PVL torch is not suitable for cutting above the water because of its high flame temperature.**
- **Never try to let the torch burn above the water for more than 10 - 20 seconds, because without cooling by the water the torch head will be damaged**.
- **The diver must make sure the torch points away from him during descent.**

- Open valve (1) 1/4 of a turn.
- Light torch with the lighter supplied with the torch (3).
- The diver can now descent, while the operator slowly adjusts the Gas pressure until the pressure indicated in the table on page 5 is reached.
- The cutting head should be held in contact with the material that is to be cut.
- Wait until a orange/red glow appears under the cutting head. (when the torch is adjusted correctly this should take a few seconds.)
- Open the cutting oxygen valve (2) 2-3 turns.
- Slowly move the PVL torch in the cutting direction.

Notes:

- **Cutting speed will depend on both the material thickness and the experience of the diver.**
- **When the PVL torch behaves restless (chatters), the Gas pressure should be reduced a little bit (a few times1/10 of a bar).**





Important!

When Gas is extracted from the bottle the temperature of the Gas in the bottle will decrease. This will result in a lower Gas pressure in the bottle (ice will be formed on the outside of the bottle), the torch will then work bad or not at all.
When this occurs with higher outside temperatures (summer) it can be solved by coupling 2 or more Gas bottles.
With lower outside temperatures (winter) it is required to heat the bottle with a warm water bath.

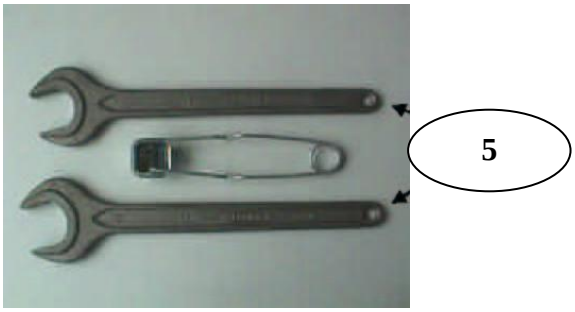
While using the PVL torch the diver should always keep in mind the dangers of cutting in tanks, vessels or other closed compartments, like with all other cutting methods.
Make sure there are no explosive or flammable materials behind the material that is being cut.
When cutting in a closed compartment, make sure the top of the compartment is ventilated. (drill !!)

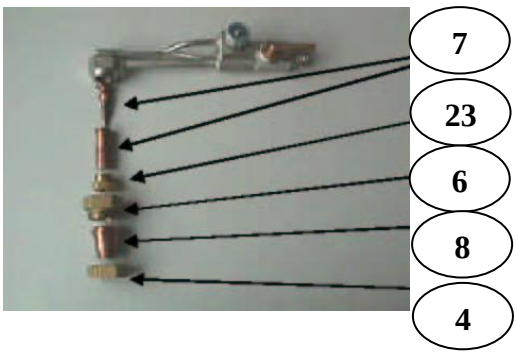
3 User maintenance

3.1 Cutting head

The cutting head will become contaminated by carbon or slag deposits after a while. The cutting head should be cleaned as explained below:

- Loosen nut (4) with the supplied spanner (5). While doing this hold nut (6) with the second spanner (to prevent damage to supply lines).
- Disassemble cutting head. (Photo)
- Remove inner gas bracket by loosening nut (23).
- Do not use sandpaper or file for cleaning, use a steel or copper wire brush.
- Make sure all passages for gas or oxygen in the inner gas brackets (7) are open, when needed they should be blown open with compressed air.
- After being used intensively for an amount of time, the outer gas bracket (8) will burn in. When it is seriously burnt in, it should be replaced.
- After use in seawater, the cutting head should be rinsed with fresh water.

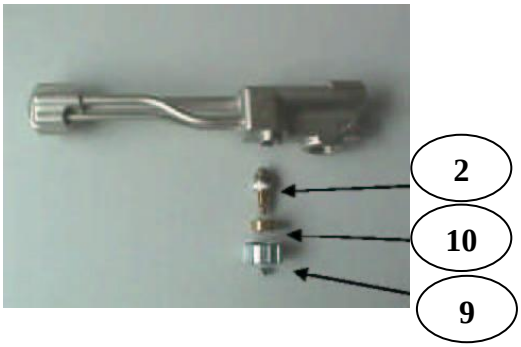




3.2 Cutting Oxygen valve

If valve (2) starts leaking or if it opens/closes to easy (it could close during cutting by a light touch) this can be solved as described below:

- Remove knob (9)
- Fasten packing gland nut (10) a little (turn right), until the valve stops leaking or until it turns a little more difficult.



3.3 Gas/Oxygen valve

3.3.1 Valve leakage

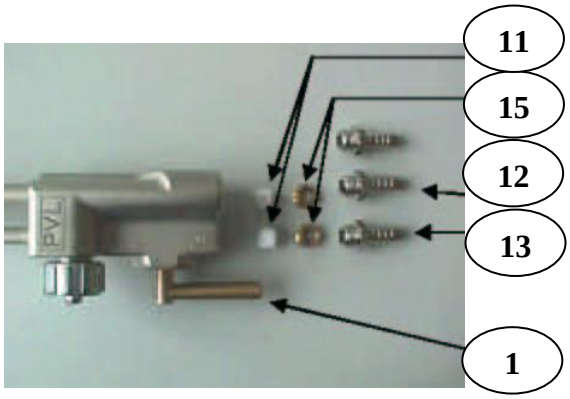
When leaking occurs, it is possible to adjust valve seats (11)
This should be done as described below:

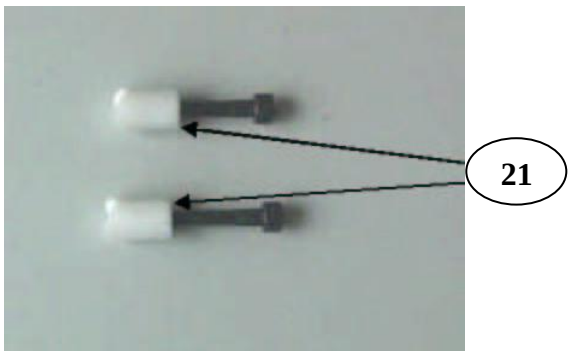
- Remove hose coupling G (12) and O^2 (13).
- Fasten the seat glands (15) to adjust the seats (turn right).

3.3.2 Replacing O-rings and seats

A spare kit for the Gas/Oxygen valve is available.
The O-rings and seats can be replaced as described below:

- Remove hose connections G (12) and O^2 (13).
- Loosen seat glands (15) with socket-head screw wrench (14) and remove them both.
- Remove both seats (11).
- Remove handle (16) by loosening screw (17).
- Loosen plug (18).
- Remove spindle (19).
- Remove old O-rings (20).
- Mount spindle (19) **without** O-rings.
- Mount dummy seats (21).
- Remount seat glands (15), and adjust them until the dummy seats lightly touch the spindle (19).
- Remove spindle (19).
- Place O-rings (20) in the spindle and lubricate them lightly with a grease suitable for oxygen use.
- Place Spindle (19) with the O-rings back in the torch. Beware not to damage the O-rings while doing this.
- Replace the O-ring (22) of the plug.
- Mount handle (16) and secure it with screw (17).
- Remove seat glands (15).
- Replace dummy seats (21) by new seats (11) and adjust these by lightly tightening the seat glands (15).
- Mount both hose connections (12 and 13).


11
15
12
13
1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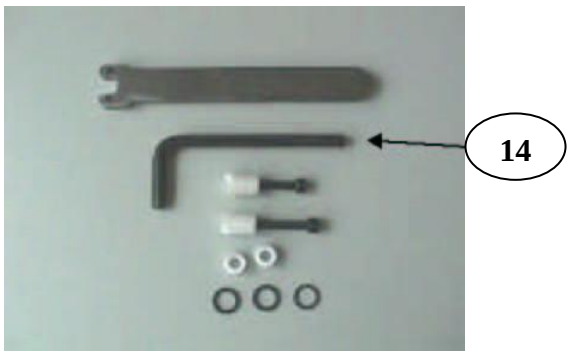
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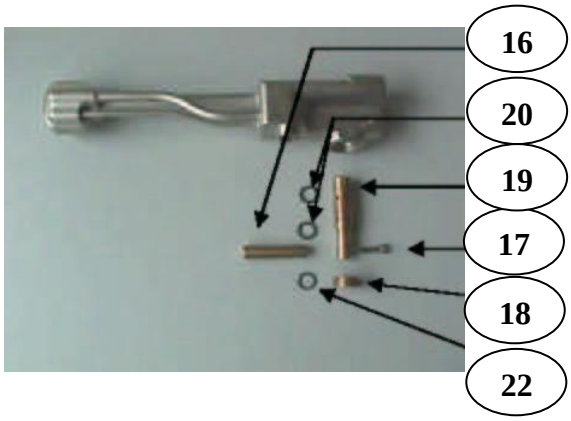
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18
22

4 Guarantee

The PVL cutting torch is guaranteed for 6 months if:

- No repairs have been made by unauthorized persons.
- The torch has been used according to this manual.
- The guarantee card has been filled in and returned.

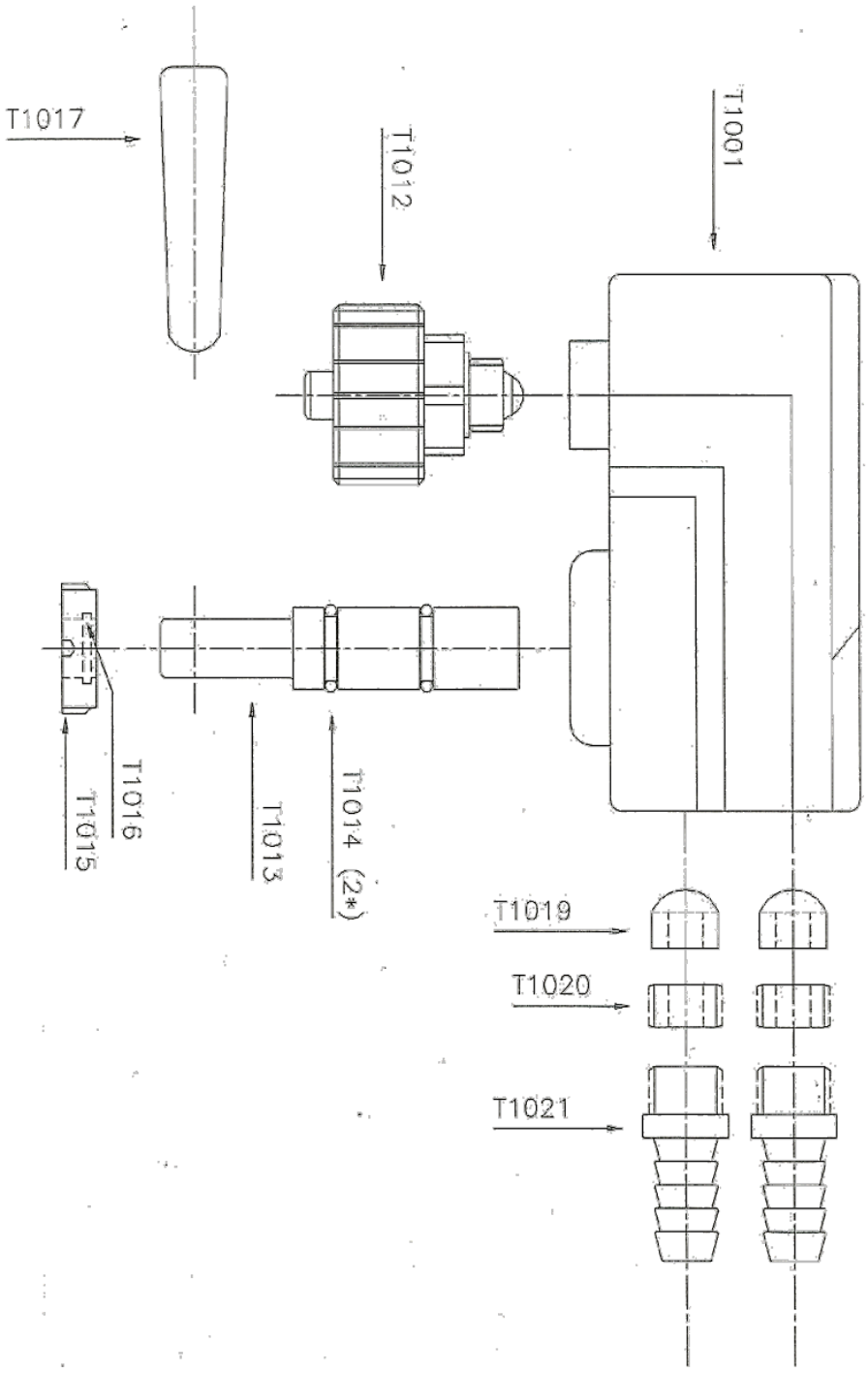
Only use original replacement parts.

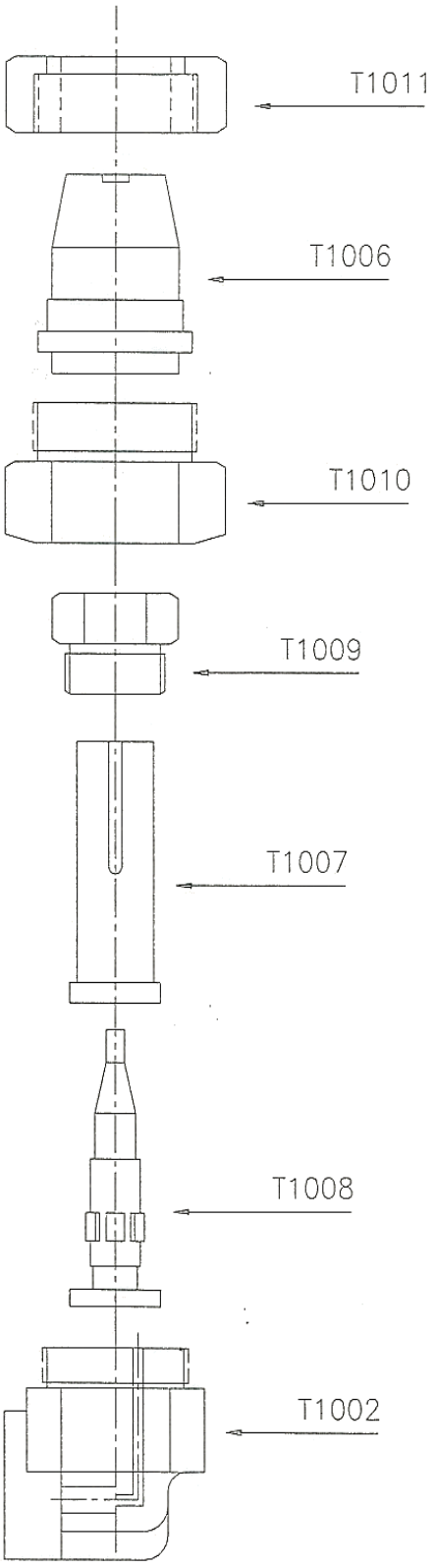
5 Ordering numbers

Ordering number	Parts underwater torch
T 1001	Grip
T 1002	Cutting head
NT 1003	Straight tube ø12
NT 1004	Straight tube ø8
NT 1005	Straight tube ø5
ST 1003	55° tube ø12
ST 1004	55° tube ø8
ST 1005	55° tube ø5
T 1006	Outer gas bracket
T 1007	Inner gas bracket case
T 1008	Inner gas bracket
T 1009	Nut for inner gas bracket
T 1010	Distance nut for outer gas bracket
T 1011	Mounting nut for outer gas bracket
T 1012	Shut-off valve cutting oxygen
T 1013	Valve spindle ø 14 gas-oxygen
T 1014	O-ring ø10 x 2
T 1015	Plug for valve spindle
T 1016	O-ring for plug ø 10 x 1,5
T 1017	Handle for gas-oxygen valve
T 1018	Screw M4 (stainless steel)
T 1019	Teflon seat
T 1020	Seat adjustment gland (G 1/4")
T 1021	Brass hose connection G 1/4", ø9 mm
T 1022	Pin wrench (stainless steel)
T 1023	Mounting accessory for O-ring valve spindle (T 1013)

6 Spare kit

Ordering numbers	Amount
T 1014	2x
T 1016	1x
T 1019	2x
T 1020	2x
T 1022	1x
T 1023	2x


T1017
T1012
T1001
T1016
T1015
T1013
T1014 (2*)
T1019
T1020
T1021


T1011
T1006
T1010
T1009
T1007
T1008
T1002